

SEQUENCE LISTING

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<120> Sugar chain synthetase

<130> A21774A

<160> 30

<210> 1

<211> 398

<212> PRT

<213> Mouse

<400> 1

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Leu Leu Leu Leu Arg Met Leu Trp Cys Pro Ala Asp Ala Pro Ala Arg

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Ser Arg Leu Leu Met Glu Gly Ser Arg Glu Asp Thr Ser Gly Thr Ser

35 40 45

Ala Ala Leu Lys Thr Leu Trp Ser Pro Thr Thr Pro Val Pro Arg Thr

50 55 60

Arg Asn Ser Thr Tyr Leu Asp Glu Lys Thr Thr Gln Ile Thr Glu Lys

65 70 75 80

Cys Lys Asp Leu Gln Tyr Ser Leu Asn Ser Leu Ser Asn Lys Thr Arg

85 90 95

Arg Tyr Ser Glu Asp Asp Tyr Leu Gln Thr Ile Thr Asn Ile Gln Arg

100 105 110

Cys Pro Trp Asn Arg Gln Ala Glu Glu Tyr Asp Asn Phe Arg Ala Lys

115 120 125

Leu Ala Ser Cys Cys Asp Ala Ile Gln Asp Phe Val Val Ser Gln Asn

130 135 140

Asn Thr Pro Val Gly Thr Asn Met Ser Tyr Glu Val Glu Ser Lys Lys

145	150	155	160
His Ile Pro Ile Arg Glu Asn Ile Phe His Met Phe Pro Val Ser Gln			
	165	170	175
Pro Phe Val Asp Tyr Pro Tyr Asn Gln Cys Ala Val Val Gly Asn Gly			
	180	185	190
Gly Ile Leu Asn Lys Ser Leu Cys Gly Ala Glu Ile Asp Lys Ser Asp			
	195	200	205
Phe Val Phe Arg Cys Asn Leu Pro Pro Ile Thr Gly Ser Ala Ser Lys			
	210	215	220
Asp Val Gly Ser Lys Thr Asn Leu Val Thr Val Asn Pro Ser Ile Ile			
225	230	235	240
Thr Leu Lys Tyr Gln Asn Leu Lys Glu Lys Lys Ala Gln Phe Leu Glu			
	245	250	255
Asp Ile Ser Thr Tyr Gly Asp Ala Phe Leu Leu Leu Pro Ala Phe Ser			
	260	265	270
Tyr Arg Ala Asn Thr Gly Ile Ser Phe Lys Val Tyr Gln Thr Leu Lys			
	275	280	285
Glu Ser Lys Met Arg Gln Lys Val Leu Phe Phe His Pro Arg Tyr Leu			
	290	295	300
Arg His Leu Ala Leu Phe Trp Arg Thr Lys Gly Val Thr Ala Tyr Arg			
305	310	315	320
Leu Ser Thr Gly Leu Met Ile Ala Ser Val Ala Val Glu Leu Cys Glu			
	325	330	335
Asn Val Lys Leu Tyr Gly Phe Trp Pro Phe Ser Lys Thr Ile Glu Asp			
	340	345	350
Thr Pro Leu Ser His His Tyr Tyr Asp Asn Met Leu Pro Lys His Gly			
	355	360	365

Phe His Gln Met Pro Lys Glu Tyr Ser Gln Met Leu Gln Leu His Met

370

375

380

Arg Gly Ile Leu Lys Leu Gln Phe Ser Lys Cys Glu Thr Ala

385

390

395

<210> 2

<211> 3166

<212> DNA

<213> Mouse

<400> 2

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Met Arg Ser Gly Gly Thr Leu Phe Ala Leu Ile

1

5

10

ggc agc ctg atg ctg ctg ctc ctc ctg cgt atg ctc tgg tgc cca gcc 157

Gly Ser Leu Met Leu Leu Leu Leu Leu Arg Met Leu Trp Cys Pro Ala

15

20

25

gac gcg cct gcc cgc tcc agg ctg ttg atg gag gga agc aga gag gac 205

Asp Ala Pro Ala Arg Ser Arg Leu Leu Met Glu Gly Ser Arg Glu Asp

30

35

40

acc agt ggt acc tca gct gca ctg aag aca ctc tgg agc ccg aca acc 253

Thr Ser Gly Thr Ser Ala Ala Leu Lys Thr Leu Trp Ser Pro Thr Thr

45

50

55

ccg gta cca cgc acc agg aac agc aca tat ctg gat gag aag aca acc 301

Pro Val Pro Arg Thr Arg Asn Ser Thr Tyr Leu Asp Glu Lys Thr Thr

60

65

70

75

caa ata aca gag aaa tgc aaa gat ctg caa tat agc ttg aac tct tta 349

Gln Ile Thr Glu Lys Cys Lys Asp Leu Gln Tyr Ser Leu Asn Ser Leu

80

85

90

tct aac aaa acg aga cgg tac tct gag gat gac tac ctc cag acc atc	397
Ser Asn Lys Thr Arg Arg Tyr Ser Glu Asp Asp Tyr Leu Gln Thr Ile	
95 100 105	
aca aac ata cag aga tgc cca tgg aac cgg caa gca gaa gaa tat gac	445
Thr Asn Ile Gln Arg Cys Pro Trp Asn Arg Gln Ala Glu Glu Tyr Asp	
110 115 120	
aat ttt aga gca aaa ctg gct tcc tgt tgc gat gcc att caa gac ttc	493
Asn Phe Arg Ala Lys Leu Ala Ser Cys Cys Asp Ala Ile Gln Asp Phe	
125 130 135	
gtg gtt tcc cag aac aac act cca gtg ggg act aac atg agc tac gag	541
Val Val Ser Gln Asn Asn Thr Pro Val Gly Thr Asn Met Ser Tyr Glu	
140 145 150 155	
gtg gaa agc aag aaa cac atc ccc att cga gag aac att ttc cac atg	589
Val Glu Ser Lys Lys His Ile Pro Ile Arg Glu Asn Ile Phe His Met	
160 165 170	
ttt cca gtg tcg cag cct ttt gtg gac tat ccc tat aac cag tgt gca	637
Phe Pro Val Ser Gln Pro Phe Val Asp Tyr Pro Tyr Asn Gln Cys Ala	
175 180 185	
gtg gtt ggt aat ggg gga att ctc aac aag tct ctc tgc gga gca gaa	685
Val Val Gly Asn Gly Gly Ile Leu Asn Lys Ser Leu Cys Gly Ala Glu	
190 195 200	
att gat aaa tct gac ttc gtc ttc agg tgt aac ctc ccc cca atc aca	733
Ile Asp Lys Ser Asp Phe Val Phe Arg Cys Asn Leu Pro Pro Ile Thr	
205 210 215	
ggg agc gct agt aaa gat gtt gga agc aaa aca aat ctt gtg act gtc	781
Gly Ser Ala Ser Lys Asp Val Gly Ser Lys Thr Asn Leu Val Thr Val	
220 225 230 235	

aat ccc agc att ata acc ctg aag tac cag aat ttg aag gag aag aaa	829
Asn Pro Ser Ile Ile Thr Leu Lys Tyr Gln Asn Leu Lys Glu Lys Lys	
240 245 250	
gca cag ttt ttg gag gac atc tcc acc tat gga gat gca ttc ctc ctc	877
Ala Gln Phe Leu Glu Asp Ile Ser Thr Tyr Gly Asp Ala Phe Leu Leu	
255 260 265	
ctg cca gca ttt tcc tat cgg gcc aac aca ggc atc tct ttt aaa gtc	925
Leu Pro Ala Phe Ser Tyr Arg Ala Asn Thr Gly Ile Ser Phe Lys Val	
270 275 280	
tac caa aca ctc aaa gag tca aaa atg agg caa aag gtt ctc ttc ttc	973
Tyr Gln Thr Leu Lys Glu Ser Lys Met Arg Gln Lys Val Leu Phe Phe	
285 290 295	
cat ccc agg tac ctg aga cac ctc gct ctt ttc tgg aga act aaa ggg	1021
His Pro Arg Tyr Leu Arg His Leu Ala Leu Phe Trp Arg Thr Lys Gly	
300 305 310 315	
gtg act gca tac cgc ttg tcc aca ggc ttg atg att gca agt gtc gct	1069
Val Thr Ala Tyr Arg Leu Ser Thr Gly Leu Met Ile Ala Ser Val Ala	
320 325 330	
gtg gaa ctg tgt gaa aac gtg aag ctc tac gga ttc tgg cct ttc tct	1117
Val Glu Leu Cys Glu Asn Val Lys Leu Tyr Gly Phe Trp Pro Phe Ser	
335 340 345	
aag act atc gaa gac acc cca ctc agt cac cac tac tat gat aac atg	1165
Lys Thr Ile Glu Asp Thr Pro Leu Ser His His Tyr Tyr Asp Asn Met	
350 355 360	
tta cct aag cat ggt ttc cac cag atg cct aaa gaa tac agc caa atg	1213
Leu Pro Lys His Gly Phe His Gln Met Pro Lys Glu Tyr Ser Gln Met	
365 370 375	

ctc cag ctc cat atg aga gga atc ctc aaa ctg caa ttc agc aaa tgt 1261  
 Leu Gln Leu His Met Arg Gly Ile Leu Lys Leu Gln Phe Ser Lys Cys

370 385 390 395

gaa acg gct taa cgtttct tagaaggaga ataatttcag gaggtggagt 1310  
 Glu Thr Ala

398

ggatgtgtca cagcatctcc aaaaagccaa tagaagaagg cacagagaaa gcatgaatta 1370  
 caaaggcgct ctcccacttg tctagaccaa agccacccgc ccccactcac tttgcagcct 1430  
 ccacgagtca ctcatctca ccttcaacgt tctttctctg agaatagaga ccaaaacatc 1490  
 agacttgat aagtaaaatg agataatctt tcaaatcatc atagaatttg atttgagcca 1550  
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 tggtaatgaa actgtgcaat tgtgccaaag accctttctg aagagaatgt ctgaatcatg 1670  
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 tgattttatt taaaatagtg aacatctact tgatatcaga cccgaggacc atcctccatt 2090  
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 tacttgagcc agcttgttgt ttatcaagt cttttttgaa gagacagcac cctgtgaatt 2870  
 cttcattctg atacagtgtc accttgtatt taacatttgt aatgttgttt caagtttaca 2930  
 tctctttcat tcttttatag caaatcaaac gtattagctt cagaaattta tcagaagttc 2990  
 atatataaat attttgcaa gggtaaaagg cttttttgtt aaataaaaata aaatttatta 3050  
 ttttcttctg atgaatagag gctcttttat gctgctgcta atgaacctaa ttagcttta 3110  
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<211> 398

<212> PRT

<213> Human

<400> 3

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Ala Arg Ile Leu Val Glu Glu Ser Arg Glu Ala Thr His Gly Thr Pro

35 40 45

Ala Ala Leu Arg Thr Leu Arg Ser Pro Ala Thr Ala Val Pro Arg Ala

50 55 60

Thr Asn Ser Thr Tyr Leu Asn Glu Lys Ser Leu Gln Leu Thr Glu Lys

65 70 75 80

Cys Lys Asn Leu Gln Tyr Gly Ile Glu Ser Phe Ser Asn Lys Thr Lys

85 90 95

Gly Tyr Ser Glu Asn Asp Tyr Leu Gln Ile Ile Thr Asp Ile Gln Ser			
100	105	110	
Cys Pro Trp Lys Arg Gln Ala Glu Glu Tyr Ala Asn Phe Arg Ala Lys			
115	120	125	
Leu Ala Ser Cys Cys Asp Ala Val Gln Asn Phe Val Val Ser Gln Asn			
130	135	140	
Asn Thr Pro Val Gly Thr Asn Met Ser Tyr Glu Val Glu Ser Lys Lys			
145	150	155	160
Glu Ile Pro Ile Lys Lys Asn Ile Phe His Met Phe Pro Val Ser Gln			
165	170	175	
Pro Phe Val Asp Tyr Pro Tyr Asn Gln Cys Ala Val Val Gly Asn Gly			
180	185	190	
Gly Ile Leu Asn Lys Ser Leu Cys Gly Thr Glu Ile Asp Lys Ser Asp			
195	200	205	
Phe Val Phe Arg Cys Asn Leu Pro Pro Thr Thr Gly Asp Val Ser Lys			
210	215	220	
Asp Val Gly Ser Lys Thr Asn Leu Val Thr Ile Asn Pro Ser Ile Ile			
225	230	235	240
Thr Leu Lys Tyr Gly Asn Leu Lys Glu Lys Lys Ala Leu Phe Leu Glu			
245	250	255	
Asp Ile Ala Thr Tyr Gly Asp Ala Phe Phe Phe Leu Pro Ala Phe Ser			
260	265	270	
Phe Arg Ala Asn Thr Gly Thr Ser Phe Lys Val Tyr Tyr Thr Leu Glu			
275	280	285	
Glu Ser Lys Ala Arg Gln Lys Val Leu Phe Phe His Pro Lys Tyr Leu			
290	295	300	
Lys Asp Leu Ala Leu Phe Trp Arg Thr Lys Gly Val Thr Ala Tyr Arg			



305	310	315	320
Leu Ser Thr Gly Leu Met Ile Thr Ser Val Ala Val Glu Leu Cys Lys			
	325	330	335
Asn Val Lys Leu Tyr Gly Phe Trp Pro Phe Ser Lys Thr Val Glu Asp			
	340	345	350
Ile Pro Val Ser His His Tyr Tyr Asp Asn Lys Leu Pro Lys His Gly			
	355	360	365
Phe His Gln Met Pro Lys Glu Tyr Ser Gln Ile Leu Gln Leu His Met			
	370	375	380
Lys Gly Ile Leu Lys Leu Gln Phe Ser Lys Cys Glu Val Ala			
385	390	395	

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atg cgg ccg ggg ggc gca ctg ctc gcc ctg ctc gcc agc ctg ctg ctg	139
Met Arg Pro Gly Gly Ala Leu Leu Ala Leu Leu Ala Ser Leu Leu Leu	
1 5 10 15	
ctg ctg ctg ctg cgc ctg ctc tgg tgc ccg gca gac gcg ccc ggc cgc	187
Leu Leu Leu Leu Arg Leu Leu Trp Cys Pro Ala Asp Ala Pro Gly Arg	
20 25 30	
gcc agg att ctg gtg gag gaa agc agg gag gcc acc cac ggc acc ccc	235
Ala Arg Ile Leu Val Glu Glu Ser Arg Glu Ala Thr His Gly Thr Pro	
35 40 45	

gca gcg ctg agg acg ctc cgg agc ccg gcg acc gcg gta ccg cgc gcc	283
Ala Ala Leu Arg Thr Leu Arg Ser Pro Ala Thr Ala Val Pro Arg Ala	
50 55 60	
act aac agc aca tat ctg aat gag aag tcg ctc caa ctg acg gag aaa	331
Thr Asn Ser Thr Tyr Leu Asn Glu Lys Ser Leu Gln Leu Thr Glu Lys	
65 70 75 80	
tgc aaa aat ctg caa tat ggc att gag tct ttc tct aac aaa acg aaa	379
Cys Lys Asn Leu Gln Tyr Gly Ile Glu Ser Phe Ser Asn Lys Thr Lys	
85 90 95	
ggg tat tca gag aac gac tac ctt cag att atc aca gat ata cag agt	427
Gly Tyr Ser Glu Asn Asp Tyr Leu Gln Ile Ile Thr Asp Ile Gln Ser	
100 105 110	
tgt cca tgg aaa cgg caa gca gaa gaa tat gca aat ttt aga gcc aaa	475
Cys Pro Trp Lys Arg Gln Ala Glu Glu Tyr Ala Asn Phe Arg Ala Lys	
115 120 125	
ctt gct tcc tgc tgt gat gct gtt caa aac ttt gtt gtt tct cag aat	523
Leu Ala Ser Cys Cys Asp Ala Val Gln Asn Phe Val Val Ser Gln Asn	
130 135 140	
aac act cca gtt ggg act aat atg agt tac gag gtg gaa agc aaa aaa	571
Asn Thr Pro Val Gly Thr Asn Met Ser Tyr Glu Val Glu Ser Lys Lys	
145 150 155 160	
gaa atc cca att aag aag aac att ttt cat atg ttt cca gtg tcc cag	619
Glu Ile Pro Ile Lys Lys Asn Ile Phe His Met Phe Pro Val Ser Gln	
165 170 175	
cct ttt gtg gac tac cct tat aat cag tgt gca gtg gtc gga aat ggg	667
Pro Phe Val Asp Tyr Pro Tyr Asn Gln Cys Ala Val Val Gly Asn Gly	
180 185 190	

gga att ctg aat aag tct ctc tgt gga act gaa ata gat aaa tcc gac	715
Gly Ile Leu Asn Lys Ser Leu Cys Gly Thr Glu Ile Asp Lys Ser Asp	
195 200 205	
ttc gtt ttt agg tgt aac cta ccc cca acc aca gga gat gtt agt aaa	763
Phe Val Phe Arg Cys Asn Leu Pro Pro Thr Thr Gly Asp Val Ser Lys	
210 215 220	
gat gtt ggc agt aaa aca aat ctt gtg act ata aat cca agc atc ata	811
Asp Val Gly Ser Lys Thr Asn Leu Val Thr Ile Asn Pro Ser Ile Ile	
225 230 235 240	
act ctg aaa tat ggg aac tta aag gaa aaa aaa gcc cta ttt ttg gag	859
Thr Leu Lys Tyr Gly Asn Leu Lys Glu Lys Lys Ala Leu Phe Leu Glu	
245 250 255	
gac att gca acc tat gga gat gca ttt ttt ttt ctg cca gca ttt tcc	907
Asp Ile Ala Thr Tyr Gly Asp Ala Phe Phe Phe Leu Pro Ala Phe Ser	
260 265 270	
ttc agg gcc aac acg ggt acc tct ttc aaa gta tac tac acg ctc gaa	955
Phe Arg Ala Asn Thr Gly Thr Ser Phe Lys Val Tyr Tyr Thr Leu Glu	
275 280 285	
gag tct aaa gca aga caa aag gtt cta ttt ttc cat ccc aag tac ctg	1003
Glu Ser Lys Ala Arg Gln Lys Val Leu Phe Phe His Pro Lys Tyr Leu	
290 295 300	
aaa gat ctg gcc ctt ttc tgg aga act aaa ggt gtg act gca tac cgc	1051
Lys Asp Leu Ala Leu Phe Trp Arg Thr Lys Gly Val Thr Ala Tyr Arg	
305 310 315 320	
ttg tcc acc ggc ttg atg atc aca agt gtt gca gtg gaa ctg tgt aaa	1099
Leu Ser Thr Gly Leu Met Ile Thr Ser Val Ala Val Glu Leu Cys Lys	
325 330 335	

aat gtg aag ctg tat gga ttc tgg ccc ttc tct aaa act gta gaa gac 1147  
Asn Val Lys Leu Tyr Gly Phe Trp Pro Phe Ser Lys Thr Val Glu Asp  
340 345 350  
ata cct gtc agc cat cac tat tat gac aac aag cta cct aaa cat ggt 1195  
Ile Pro Val Ser His His Tyr Tyr Asp Asn Lys Leu Pro Lys His Gly  
355 360 365  
ttc cat cag atg ccc aaa gaa tac agc cag atc ctc caa ctt cac atg 1243  
Phe His Gln Met Pro Lys Glu Tyr Ser Gln Ile Leu Gln Leu His Met  
370 375 380  
aaa gga atc ctc aaa ctg caa ttt agc aaa tgt gaa gtc gcc taa 1288  
Lys Gly Ile Leu Lys Leu Gln Phe Ser Lys Cys Glu Val Ala  
385 390 395  
acaaagtatc ttaaaatggg aataatttta atataatgca gtaggtgatt aacaatgtct 1348  
ccaaacacca aaggaggtgg ctaaagagta ttttgagatg agccccaaaa tttggtttga 1408  
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<211> 529

<212> PRT

<213> Human

<400> 5

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20 25 30  
Ser Asn Pro Ala Glu Pro Val Pro Ser Ser Leu Ser Phe Leu Glu Thr  
35 40 45  
Arg Arg Leu Leu Pro Val Gln Gly Lys Gln Arg Ala Ile Met Gly Ala

50	55	60
Ala His Glu Pro Ser Pro Pro Gly Gly Leu Asp Ala Arg Gln Ala Leu		
65	70	75
Pro Arg Ala His Pro Ala Gly Ser Phe His Ala Gly Pro Gly Asp Leu		
85	90	95
Gln Lys Trp Ala Gln Ser Gln Asp Gly Phe Glu His Lys Glu Phe Phe		
100	105	110
Ser Ser Gln Val Gly Arg Lys Ser Gln Ser Ala Phe Tyr Pro Glu Asp		
115	120	125
Asp Asp Tyr Phe Phe Ala Ala Gly Gln Pro Gly Trp His Ser His Thr		
130	135	140
Gln Gly Thr Leu Gly Phe Pro Ser Pro Gly Glu Pro Gly Pro Arg Glu		
145	150	155
Gly Ala Phe Pro Ala Ala Gln Val Gln Arg Arg Arg Val Lys Lys Arg		
165	170	175
His Arg Arg Gln Arg Arg Ser His Val Leu Glu Glu Gly Asp Asp Gly		
180	185	190
Asp Arg Leu Tyr Ser Ser Met Ser Arg Ala Phe Leu Tyr Arg Leu Trp		
195	200	205
Lys Gly Asn Val Ser Ser Lys Met Leu Asn Pro Arg Leu Gln Lys Ala		
210	215	220
Met Lys Asp Tyr Leu Thr Ala Asn Lys His Gly Val Arg Phe Arg Gly		
225	230	235
Lys Arg Glu Ala Gly Leu Ser Arg Ala Gln Leu Leu Cys Gln Leu Arg		
245	250	255
Ser Arg Ala Arg Val Arg Thr Leu Asp Gly Thr Glu Ala Pro Phe Ser		
260	265	270

Ala Leu Gly Trp Arg Arg Leu Val Pro Ala Val Pro Leu Ser Gln Leu  
 275 280 285  
 His Pro Arg Gly Leu Arg Ser Cys Ala Val Val Met Ser Ala Gly Ala  
 290 295 300  
 Ile Leu Asn Ser Ser Leu Gly Glu Glu Ile Asp Ser His Asp Ala Val  
 305 310 315 320  
 Leu Arg Phe Asn Ser Ala Pro Thr Arg Gly Tyr Glu Lys Asp Val Gly  
 325 330 335  
 Asn Lys Thr Thr Ile Arg Ile Ile Asn Ser Gln Ile Leu Thr Asn Pro  
 340 345 350  
 Ser His His Phe Ile Asp Ser Ser Leu Tyr Lys Asp Val Ile Leu Val  
 355 360 365  
 Ala Trp Asp Pro Ala Pro Tyr Ser Ala Asn Leu Asn Leu Trp Tyr Lys  
 370 375 380  
 Lys Pro Asp Tyr Asn Leu Phe Thr Pro Tyr Ile Gln His Arg Gln Arg  
 385 390 395 400  
 Asn Pro Asn Gln Pro Phe Tyr Ile Leu His Pro Lys Phe Ile Trp Gln  
 405 410 415  
 Leu Trp Asp Ile Ile Gln Glu Asn Thr Lys Glu Lys Ile Gln Pro Asn  
 420 425 430  
 Pro Pro Ser Ser Gly Phe Ile Gly Ile Leu Ile Met Met Ser Met Cys  
 435 440 445  
 Arg Glu Val His Val Tyr Glu Tyr Ile Pro Ser Val Arg Gln Thr Glu  
 450 455 460  
 Leu Cys His Tyr His Glu Leu Tyr Tyr Asp Ala Ala Cys Thr Leu Gly  
 465 470 475 480  
 Ala Tyr His Pro Leu Leu Tyr Glu Lys Leu Leu Val Gln Arg Leu Asn

	485	490	495
Met Gly Thr Gln Gly Asp Leu His Arg Lys Gly Lys Val Val Leu Pro			
	500	505	510
Gly Phe Gln Ala Val His Cys Pro Ala Pro Ser Pro Val Ile Pro His			
	515	520	525
Ser			

<210> 6  
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 <212> DNA  
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 <400> 6

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tcattctgccacccatctgcattaagacacaaggtgctgaccgcagagacctgcc	175
atg aaa cca cac ttg aag caa tgg aga caa cga atg ctt ttc gga ata	223
Met Lys Pro His Leu Lys Gln Trp Arg Gln Arg Met Leu Phe Gly Ile	
1 5 10 15	
ttc gct tgg ggg ctc ctc ttt ttg ctg att ttc atc tac ttc acc gac	271
Phe Ala Trp Gly Leu Leu Phe Leu Leu Ile Phe Ile Tyr Phe Thr Asp	
20 25 30	
agc aac ccc gct gag cct gta ccc agc tcc ctc tcc ttc ctg gag acc	319
Ser Asn Pro Ala Glu Pro Val Pro Ser Ser Leu Ser Phe Leu Glu Thr	
35 40 45	
agg agg ctc ctg ccg gtg cag ggg aag cag cgg gcc atc atg ggc gcc	367
Arg Arg Leu Leu Pro Val Gln Gly Lys Gln Arg Ala Ile Met Gly Ala	
50 55 60	
gca cat gag ccc tcc ccg cct ggg ggc ctg gac gca cgc cag gcg ctg	415
Ala His Glu Pro Ser Pro Pro Gly Gly Leu Asp Ala Arg Gln Ala Leu	

65	70	75	80	
ccc cgc gcc cac cca gcc ggt tcc ttt cat gcg ggg cct gga gac ctg	463			
Pro Arg Ala His Pro Ala Gly Ser Phe His Ala Gly Pro Gly Asp Leu				
85	90	95		
cag aaa tgg gcc cag tcc caa gat ggg ttt gaa cat aaa gag ttt ttt	511			
Gln Lys Trp Ala Gln Ser Gln Asp Gly Phe Glu His Lys Glu Phe Phe				
100	105	110		
tca tcc cag gtg ggg aga aaa tct caa agt gct ttc tac ccg gag gat	559			
Ser Ser Gln Val Gly Arg Lys Ser Gln Ser Ala Phe Tyr Pro Glu Asp				
115	120	125		
gac gac tac ttt ttt gct gct ggt cag cca ggg tgg cac agc cac act	607			
Asp Asp Tyr Phe Phe Ala Ala Gly Gln Pro Gly Trp His Ser His Thr				
130	135	140		
cag ggg aca ttg gga ttc cct tcc ccc ggg gag cca ggc cca cgg gag	655			
Gln Gly Thr Leu Gly Phe Pro Ser Pro Gly Glu Pro Gly Pro Arg Glu				
145	150	155	160	
ggg gct ttt ccg gct gca cag gtc cag agg agg cgg gtg aag aag agg	703			
Gly Ala Phe Pro Ala Ala Gln Val Gln Arg Arg Arg Val Lys Lys Arg				
165	170	175		
cac cgg agg cag aga agg agc cac gtg ttg gag gag ggc gac gac ggc	751			
His Arg Arg Gln Arg Arg Ser His Val Leu Glu Glu Gly Asp Asp Gly				
180	185	190		
gac agg ctg tac tcc tcc atg tcc agg gcc ttc ctg tac cgg ctc tgg	799			
Asp Arg Leu Tyr Ser Ser Met Ser Arg Ala Phe Leu Tyr Arg Leu Trp				
195	200	205		
aag ggg aac gtc tct tcc aaa atg ctg aac ccg cgc ctg cag aag gcg	847			
Lys Gly Asn Val Ser Ser Lys Met Leu Asn Pro Arg Leu Gln Lys Ala				



210	215	220	
atg aag gat tac ctg acc gcc aac aag cac ggg gtg cgc ttc cgc ggg	895		
Met Lys Asp Tyr Leu Thr Ala Asn Lys His Gly Val Arg Phe Arg Gly			
225	230	235	240
aag cgg gag gcc ggg ctg agc agg gca cag ctg ctg tgc cag ctg cgg	943		
Lys Arg Glu Ala Gly Leu Ser Arg Ala Gln Leu Leu Cys Gln Leu Arg			
245	250	255	
agc cgc gcg cgc gtg cgg acg ctg gac ggc acc gag gcg ccc ttt tct	991		
Ser Arg Ala Arg Val Arg Thr Leu Asp Gly Thr Glu Ala Pro Phe Ser			
260	265	270	
gcg ctg ggc tgg cgg cgc ctg gtg ccc gcc gtg ccc ctg agc cag ctg	1039		
Ala Leu Gly Trp Arg Arg Leu Val Pro Ala Val Pro Leu Ser Gln Leu			
275	280	285	
cac ccc cgc ggc ctg cgc agc tgc gct gtc gtc atg tct gca ggc gca	1087		
His Pro Arg Gly Leu Arg Ser Cys Ala Val Val Met Ser Ala Gly Ala			
290	295	300	
atc ctc aac tct tcc ttg ggc gag gaa ata gat tct cat gat gcg gtt	1135		
Ile Leu Asn Ser Ser Leu Gly Glu Glu Ile Asp Ser His Asp Ala Val			
305	310	315	320
ttg aga ttt aac tct gct cct aca cgt ggt tat gag aaa gat gtt ggg	1183		
Leu Arg Phe Asn Ser Ala Pro Thr Arg Gly Tyr Glu Lys Asp Val Gly			
325	330	335	
aat aaa acc acc ata cgc atc att aat tcg cag att ctg acc aac ccc	1231		
Asn Lys Thr Thr Ile Arg Ile Ile Asn Ser Gln Ile Leu Thr Asn Pro			
340	345	350	
agc cat cac ttc att gac agt tca ctg tat aaa gac gtc att ttg gtg	1279		
Ser His His Phe Ile Asp Ser Ser Leu Tyr Lys Asp Val Ile Leu Val			

355	360	365	
gcc tgg gac cct gcc cca tat tcc gca aat ctt aac ctg tgg tac aaa 1327			
Ala Trp Asp Pro Ala Pro Tyr Ser Ala Asn Leu Asn Leu Trp Tyr Lys			
370	375	380	
aaa ccg gat tac aac ctg ttc act cca tat att cag cat cgt cag aga 1375			
Lys Pro Asp Tyr Asn Leu Phe Thr Pro Tyr Ile Gln His Arg Gln Arg			
385	390	395	400
aac cca aat cag cca ttt tac att ctt cat cct aaa ttt ata tgg cag 1423			
Asn Pro Asn Gln Pro Phe Tyr Ile Leu His Pro Lys Phe Ile Trp Gln			
	405	410	415
ctc tgg gat att atc cag gag aac act aaa gag aag att caa cca aac 1471			
Leu Trp Asp Ile Ile Gln Glu Asn Thr Lys Glu Lys Ile Gln Pro Asn			
	420	425	430
cca cca tct tct ggt ttc att gga atc ctc atc atg atg tcc atg tgc 1519			
Pro Pro Ser Ser Gly Phe Ile Gly Ile Leu Ile Met Met Ser Met Cys			
435	440	445	
aga gag gtg cac gtg tat gaa tat atc cca tcc gtg cgg cag acg gag 1567			
Arg Glu Val His Val Tyr Glu Tyr Ile Pro Ser Val Arg Gln Thr Glu			
450	455	460	
ctg tgc cac tac cac gag ctg tac tac gac gca gcc tgc acc ctc ggg 1615			
Leu Cys His Tyr His Glu Leu Tyr Tyr Asp Ala Ala Cys Thr Leu Gly			
465	470	475	480
gcg tac cac cca cta ctc tat gag aag ctc ctg gtg cag cgc ctg aac 1663			
Ala Tyr His Pro Leu Leu Tyr Glu Lys Leu Leu Val Gln Arg Leu Asn			
	485	490	495
atg ggc acg cag ggg gat ttg cat cgc aag ggc aag gtg gtt ctt cct 1711			
Met Gly Thr Gln Gly Asp Leu His Arg Lys Gly Lys Val Val Leu Pro			

500                      505                      510  
 ggc ttc cag gcg gtg cac tgc cct gca cca agt cca gtc att cca cac 1759  
 Gly Phe Gln Ala Val His Cys Pro Ala Pro Ser Pro Val Ile Pro His  
 515                      520                      525  
 tct taaaaagggtttcttggaatcaatgtgcaatggtaca                      1800  
 Ser

<210> 7  
 <211> 524  
 <212> PRT  
 <213> Mouse  
 <400> 7

Met Lys Pro His Leu Lys Gln Trp Arg Gln Arg Met Leu Phe Gly Ile  
 1                      5                      10                      15  
 Phe Val Trp Gly Leu Leu Phe Leu Ala Ile Phe Ile Tyr Phe Thr Asn  
 20                      25                      30  
 Ser Asn Pro Ala Ala Pro Met Pro Ser Ser Phe Ser Phe Leu Glu Ser  
 35                      40                      45  
 Arg Gly Leu Leu Pro Leu Gln Gly Lys Gln Arg Val Ile Met Gly Ala  
 50                      55                      60  
 Leu Gln Glu Pro Ser Leu Pro Arg Ser Leu Asp Ala Ser Lys Val Leu  
 65                      70                      75                      80  
 Leu Asp Ser His Pro Glu Asn Pro Phe His Pro Trp Pro Gly Asp Pro  
 85                      90                      95  
 Gln Lys Trp Asp Gln Ala Pro Asn Gly Phe Asp Asn Gly Asp Glu Phe  
 100                      105                      110  
 Phe Thr Ser Gln Val Gly Arg Lys Ser Gln Ser Ala Phe Tyr Pro Glu  
 115                      120                      125  
 Glu Asp Ser Tyr Phe Phe Val Ala Asp Gln Pro Glu Leu Tyr His His

130	135	140	
Arg Gln Gly Ala Leu Glu Leu Pro Ser Pro Gly Glu Thr Ser Trp Arg			
145	150	155	160
Ser Gly Pro Val Gln Pro Lys Gln Lys Leu Leu His Pro Arg Arg Gly			
	165	170	175
Ser Leu Pro Glu Glu Ala Tyr Asp Ser Asp Met Leu Ser Ala Ser Met			
	180	185	190
Ser Arg Ala Phe Leu Tyr Arg Leu Trp Lys Gly Ala Val Ser Ser Lys			
	195	200	205
Met Leu Asn Pro Arg Leu Gln Lys Ala Met Arg Tyr Tyr Met Ser Phe			
	210	215	220
Asn Lys His Gly Val Arg Phe Arg Arg Arg Gly Arg Arg Glu Ala Thr			
225	230	235	240
Arg Thr Gly Pro Glu Leu Leu Cys Glu Met Arg Arg Arg Val Arg Val			
	245	250	255
Arg Thr Leu Asp Gly Arg Glu Ala Pro Phe Ser Gly Leu Gly Trp Arg			
	260	265	270
Pro Leu Val Pro Gly Val Pro Leu Ser Gln Leu His Pro Arg Gly Leu			
	275	280	285
Ser Ser Cys Ala Val Val Met Ser Ala Gly Ala Ile Leu Asn Ser Ser			
	290	295	300
Leu Gly Glu Glu Ile Asp Ser His Asp Ala Val Leu Arg Phe Asn Ser			
305	310	315	320
Ala Pro Thr Arg Gly Tyr Glu Lys Asp Val Gly Asn Lys Thr Thr Val			
	325	330	335
Arg Ile Ile Asn Ser Gln Ile Leu Ala Asn Pro Ser His His Phe Ile			
	340	345	350

Asp Ser Ala Leu Tyr Lys Asp Val Ile Leu Val Ala Trp Asp Pro Ala			
355	360	365	
Pro Tyr Ser Ala Asn Leu Asn Leu Trp Tyr Lys Lys Pro Asp Tyr Asn			
370	375	380	
Leu Phe Thr Pro Tyr Ile Gln His Arg Arg Lys Tyr Pro Thr Gln Pro			
385	390	395	400
Phe Tyr Ile Leu His Pro Lys Phe Ile Trp Gln Leu Trp Asp Ile Ile			
405	410	415	
Gln Glu Asn Thr Arg Glu Lys Ile Gln Pro Asn Pro Pro Ser Ser Gly			
420	425	430	
Phe Ile Gly Ile Leu Ile Met Met Ser Met Cys Lys Glu Val His Val			
435	440	445	
Tyr Glu Tyr Ile Pro Ser Val Arg Gln Thr Glu Leu Cys His Tyr His			
450	455	460	
Glu Leu Tyr Tyr Asp Ala Ala Cys Thr Leu Gly Ala Tyr His Pro Leu			
465	470	475	480
Leu Tyr Glu Lys Leu Leu Val Gln Arg Leu Asn Thr Gly Thr Gln Ala			
485	490	495	
Asp Leu His His Lys Gly Lys Val Val Leu Pro Gly Phe Gln Thr Leu			
500	505	510	
Arg Cys Pro Val Thr Ser Pro Asn Asn Thr His Ser			
515	520		

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<211> 1611

<212> DNA

<213> Mouse

<400> 8

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Met Lys Pro His Leu Lys Gln Trp Arg Gln Arg Met Leu Phe Gly Ile	
1 5 10 15	
ttt gtt tgg ggg ctc ctc ttt ttg gca att ttc atc tac ttc acc aac	98
Phe Val Trp Gly Leu Leu Phe Leu Ala Ile Phe Ile Tyr Phe Thr Asn	
20 25 30	
agc aat cct gcg gca cct atg ccc agc tcc ttt tcc ttc ctg gag agc	146
Ser Asn Pro Ala Ala Pro Met Pro Ser Ser Phe Ser Phe Leu Glu Ser	
35 40 45	
cgt ggg ctc ctg cct cta cag ggc aag cag cgg gtc atc atg ggc gct	194
Arg Gly Leu Leu Pro Leu Gln Gly Lys Gln Arg Val Ile Met Gly Ala	
50 55 60	
ttg cag gaa ccc tct ttg ccc aga agt ttg gat gca agc aaa gtg ctt	242
Leu Gln Glu Pro Ser Leu Pro Arg Ser Leu Asp Ala Ser Lys Val Leu	
65 70 75 80	
ctg gac agc cac cct gag aac cct ttc cac cct tgg cct ggg gac cca	290
Leu Asp Ser His Pro Glu Asn Pro Phe His Pro Trp Pro Gly Asp Pro	
85 90 95	
cag aaa tgg gat cag gcc cca aat ggc ttt gac aat ggg gat gag ttt	338
Gln Lys Trp Asp Gln Ala Pro Asn Gly Phe Asp Asn Gly Asp Glu Phe	
100 105 110	
ttt aca tcc cag gtt ggg agg aaa tca caa agc gct ttc tat ccc gag	386
Phe Thr Ser Gln Val Gly Arg Lys Ser Gln Ser Ala Phe Tyr Pro Glu	
115 120 125	
gaa gat agc tat ttt ttt gtt gcg gat cag cct gag ttg tac cac cac	434
Glu Asp Ser Tyr Phe Phe Val Ala Asp Gln Pro Glu Leu Tyr His His	
130 135 140	

agg cag ggt gca ctg gag ctg cca tct cca ggg gag aca tca tgg cga 482  
 Arg Gln Gly Ala Leu Glu Leu Pro Ser Pro Gly Glu Thr Ser Trp Arg  
 145 150 155 160  
 tca gga cct gtt cag ccc aag cag aag ctg ctt cac cca agg cga ggc 530  
 Ser Gly Pro Val Gln Pro Lys Gln Lys Leu Leu His Pro Arg Arg Gly  
 165 170 175  
 agc ttg cct gag gaa gcc tat gac agc gac atg ctg tca gcc tcc atg 578  
 Ser Leu Pro Glu Glu Ala Tyr Asp Ser Asp Met Leu Ser Ala Ser Met  
 180 185 190  
 tcg aga gcc ttc ctg tac cgg ctc tgg aag ggg gcc gtg tcc tct aag 626  
 Ser Arg Ala Phe Leu Tyr Arg Leu Trp Lys Gly Ala Val Ser Ser Lys  
 195 200 205  
 atg ttg aac ccg cgc ctg cag aag gcc atg cgt tac tac atg tcc ttc 674  
 Met Leu Asn Pro Arg Leu Gln Lys Ala Met Arg Tyr Tyr Met Ser Phe  
 210 215 220  
 aac aag cat ggt gtg cgc ttc cgc agg cgg ggt cgg cgt gaa gct aca 722  
 Asn Lys His Gly Val Arg Phe Arg Arg Arg Gly Arg Arg Glu Ala Thr  
 225 230 235 240  
 cgt aca ggg ccg gag ctg ctg tgt gag atg cgc aga cgt gtg cgt gtg 770  
 Arg Thr Gly Pro Glu Leu Leu Cys Glu Met Arg Arg Arg Val Arg Val  
 245 250 255  
 cgc acg ttg gac ggc aga gag gcg ccc ttc tcg ggg ctg ggc tgg cgg 818  
 Arg Thr Leu Asp Gly Arg Glu Ala Pro Phe Ser Gly Leu Gly Trp Arg  
 260 265 270  
 cct ctg gta cca ggt gta cct ctg agc cag ttg cac ccg cgc ggt ctg 866  
 Pro Leu Val Pro Gly Val Pro Leu Ser Gln Leu His Pro Arg Gly Leu  
 275 280 285

agc agc tgc gca gtt gtc atg tct gcc ggt gcc atc ctg aac tcc tcc 914  
 Ser Ser Cys Ala Val Val Met Ser Ala Gly Ala Ile Leu Asn Ser Ser  
 290 295 300  
 ttg ggg gag gaa atc gat tct cat gat gca gtt ttg aga ttt aac tct 962  
 Leu Gly Glu Glu Ile Asp Ser His Asp Ala Val Leu Arg Phe Asn Ser  
 305 310 315 320  
 gcc cct acc cgt ggc tac gag aaa gat gtc gga aat aaa acc aca gta 1010  
 Ala Pro Thr Arg Gly Tyr Glu Lys Asp Val Gly Asn Lys Thr Thr Val  
 325 330 335  
 cgc atc att aat tct cag att ctg gcc aac ccc agc cat cac ttc att 1058  
 Arg Ile Ile Asn Ser Gln Ile Leu Ala Asn Pro Ser His His Phe Ile  
 340 345 350  
 gac agt gct tta tat aaa gat gtt atc ctg gta gcc tgg gat cct gct 1106  
 Asp Ser Ala Leu Tyr Lys Asp Val Ile Leu Val Ala Trp Asp Pro Ala  
 355 360 365  
 cct tat tct gcc aat ctt aac ctg tgg tat aag aag cca gat tac aac 1154  
 Pro Tyr Ser Ala Asn Leu Asn Leu Trp Tyr Lys Lys Pro Asp Tyr Asn  
 370 375 380  
 ctt ttc act cca tat atc cag cat cgc cgg aaa tac ccg act cag cca 1202  
 Leu Phe Thr Pro Tyr Ile Gln His Arg Arg Lys Tyr Pro Thr Gln Pro  
 385 390 395 400  
 ttt tac att ctt cac ccc aag ttc ata tgg cag ctt tgg gac att atc 1250  
 Phe Tyr Ile Leu His Pro Lys Phe Ile Trp Gln Leu Trp Asp Ile Ile  
 405 410 415  
 cag gag aat aca agg gag aag ata cag ccc aac cca cca tct tct ggt 1298  
 Gln Glu Asn Thr Arg Glu Lys Ile Gln Pro Asn Pro Pro Ser Ser Gly  
 420 425 430



ttt att gga atc ctc atc atg atg tcc atg tgt aaa gag gtg cac gtg 1346  
 Phe Ile Gly Ile Leu Ile Met Met Ser Met Cys Lys Glu Val His Val  
           435                          440                          445  
 tat gag tac atc cca tct gtt cga cag aca gag ctt tgc cac tac cat 1394  
 Tyr Glu Tyr Ile Pro Ser Val Arg Gln Thr Glu Leu Cys His Tyr His  
           450                          455                          460  
 gag ctg tac tac gac gca gcc tgc acc ttg ggg gcc tac cac cca ctg 1442  
 Glu Leu Tyr Tyr Asp Ala Ala Cys Thr Leu Gly Ala Tyr His Pro Leu  
 465                          470                          475                          480  
 ctc tat gaa aag cta ctg gtg cag cgc ctt aac aca ggc acc cag gca 1490  
 Leu Tyr Glu Lys Leu Leu Val Gln Arg Leu Asn Thr Gly Thr Gln Ala  
                           485                          490                          495  
 gac ttg cat cac aag ggc aag gta gtc ttg cca ggc ttc cag acc ctt 1538  
 Asp Leu His His Lys Gly Lys Val Val Leu Pro Gly Phe Gln Thr Leu  
                           500                          505                          510  
 cgg tgt cca gta acc agc ccc aac aat aca cat tct taa 1577  
 Arg Cys Pro Val Thr Ser Pro Asn Asn Thr His Ser  
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 aatggaactc ttgggaactg atgtgcaata aggt 1611

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<211> 20

<212> DNA

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<400> 9

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 <400> 10  
 aattgcagtt tgaggattcc 20

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<210> 17

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